

COMMENTS  
PROPOSED JORDAN LAKE NUTRIENT MANAGEMENT STRATEGY RULES  
September 2007

The status and fate of Jordan Lake has drawn regional, if not statewide attention. The City of Burlington recognizes that a safe potable water supply and good water quality are important resources for the protection of public health, a healthy environment, recreation, and the continued prosperity of our region. The City is a proponent of clean water, and spends millions of dollars annually to help protect the lakes and streams in our region.

NCDENR – Department of Environment and Natural Resources

DWQ – Division of Water Quality, Department of Environment and Natural Resources

THE LAKE

1. The physical configuration of Jordan Lake makes it behave like several different water bodies.
  - The New Hope arm is relatively shallow and causeways with narrow openings segment the lake and restrict flow.
  - The hydraulic detention time in the New Hope arm of the lake is estimated to be over 400 days.
  - The point source dischargers on the Upper New Hope Arm of the lake are physically closer to the lake.
  - The Haw River arm of the lake is deeper on average than the New Hope arm.
  - The Haw River arm has a shorter hydraulic detention time under normal flows (approximately one (1) week), and exhibits different water quality characteristics from the New Hope side.
  - The Haw River wastewater dischargers contributing nutrients to the lake are farther away from the lake's boundary.
2. Nutrient loading at the lake is a function of the flow reaching the lake. Because the Haw River watershed is much larger than the New Hope arm watershed, there is more flow coming into the lake on the Haw River side. This higher flow brings in more pounds of nitrogen and phosphorus. This does not mean that the Haw River arm is experiencing more pollution.

**Given the differences between the New Hope Arm and Haw River Arm of Jordan Lake, it is reasonable to treat the two major branches of this lake as distinct with distinct rules applying to each.**

THE SCIENCE

3. During the development of the nutrient response model for Jordan Lake, problems with the NCDENR/DWQ data were identified. The Jordan Lake Project Partners who

paid for the model questioned the amount of data, the spatial and temporal coverage of the data, and the analytical procedures used. Also, the consulting firm TetraTech, who developed the model, and provided modeling services for the Jordan Lake watershed local governments and NCDENR/DWQ questioned the data quality and quantity.

- The 1996 – 2000 chlorophyll *a* data was analyzed incorrectly. According to a TetraTech report that addressed the data quality issues, the analytical standards were not calculated correctly; the wrong procedure was used for the instrumentation in the lab; and the final results were calculated incorrectly.
- DWQ stated in response to our inquiry of the analytical problems that the incorrect data is acceptable if you consider only data collected in July – September, which happened to be the bulk of the data collected by DWQ.
- The model was developed using the estimated data from 1996 – 2000.
- In 2001 NCDENR staff said they did not have the resources to collect more data, so the Jordan Lake Project Partners offered to contract with a commercial laboratory to collect new samples and have them analyzed properly. NCDENR staff rejected this offer.
- NCDENR collected samples on 12 dates in 2001 from April 30 to November 7.
- NCDENR collected samples on 3 dates in 2003 for a total of 15 sample dates that DWQ says were analyzed correctly, and could be used to develop the nutrient response model and management strategy.
- Despite assurances by DWQ, the data problems remain unresolved.
- TetraTech wrote “Evaluation of uncertainty in the model is complicated by the presence of considerable analytical uncertainty in chlorophyll *a* measurements.”
- “This in turn suggests that better model performance cannot be attained without greatly enhanced monitoring data.” - TetraTech

To summarize the situation with the data, a TetraTech modeling report to DWQ in 2003 states that from September 1996 through January 1999 uncorrected data are relatively accurate but corrected data may be inaccurate, thus allowing consideration of interferences in the analysis. TetraTech further states in this report that from “...February 1999 through January 2001 both standards and analytical procedures were in error...” so corrected data cannot be recovered and original documentation was used to generate revised “uncorrected” data. It is unfortunate but TetraTech concluded that “In sum, for the period in which the best data are available for flow, temperature, and tributary loads, reliable corrected chlorophyll *a* data are not available.”

4. Impairment in the lake is being judged on a limited number of chlorophyll *a* samples. There were no samples collected in 2002 and 2004. DWQ chlorophyll *a* data collected from April to August 2005 was invalidated because the samples were not analyzed according to the approved analytical protocol. In 2006 and again in 2007 DWQ has participated in laboratory comparison testing for chlorophyll *a* for method development. Nutrient reduction targets are based on a model that was developed using

samples (1996 – 2000) that were improperly analyzed. This is a shaky justification for the expenditure of roughly \$1 billion.

5. In March of 2005 the local governments in the Haw River watershed contracted with a State-approved commercial lab to collect and analyze samples from NCDENR monitoring sites in the Haw River arm of Jordan Lake. Through July 17, 2007, 114 samples have been collected and only 3 samples exceeded the 40 microgram per liter chlorophyll *a* water quality standard. About 20% of the samples exceeded 9.0 pH units, which is not unusual for piedmont lakes. On August 29, 2007 the local governments were notified by DWQ that a study conducted by DWQ in May 2007 cast doubt on the validity of the results of the certified commercial laboratory. During this same time period, the DWQ data collected on the Haw River Arm indicates that 8 of 50 samples exceeded the 40 µg/L standard. This is still not indicative of a drastic situation and there is time to come up with appropriate strategies.

6. Samples collected by NCDENR and the local governments that exceeded the 40 microgram per liter chlorophyll *a* water quality standard were observed during periods of moderate to extreme drought. The NCDENR 2001 sampling dates used to calibrate the nutrient response model for Jordan Lake included the worst drought of record during the years 2000-2002. The potential role of drought or other abnormal weather conditions cannot be ruled out in this complex ecosystem.

7. TetraTech was the consulting firm that developed the model for the Jordan Lake Project Partners, and then modified it with new data for NCDENR staff. In a memo to the state staff TetraTech pointed out multiple problems with the data used, the assumptions based on the model, and the plans to use this information. TetraTech stated *“Evaluation of uncertainty in the model is complicated by the presence of considerable analytical uncertainty in chlorophyll *a* measurements.”* TetraTech went on to state that *“This in turn suggests that better model performance cannot be attained without greatly enhanced monitoring data. In sum the Jordan Lake model as currently implemented is not a particularly good predictor of individual point measurements of chlorophyll *a* ...”*. DWQ states *“We agree that there is uncertainty in the analysis connecting specific levels of nutrient loads to predicted frequency of chlorophyll *a* concentrations greater than 40 µg/L.”*

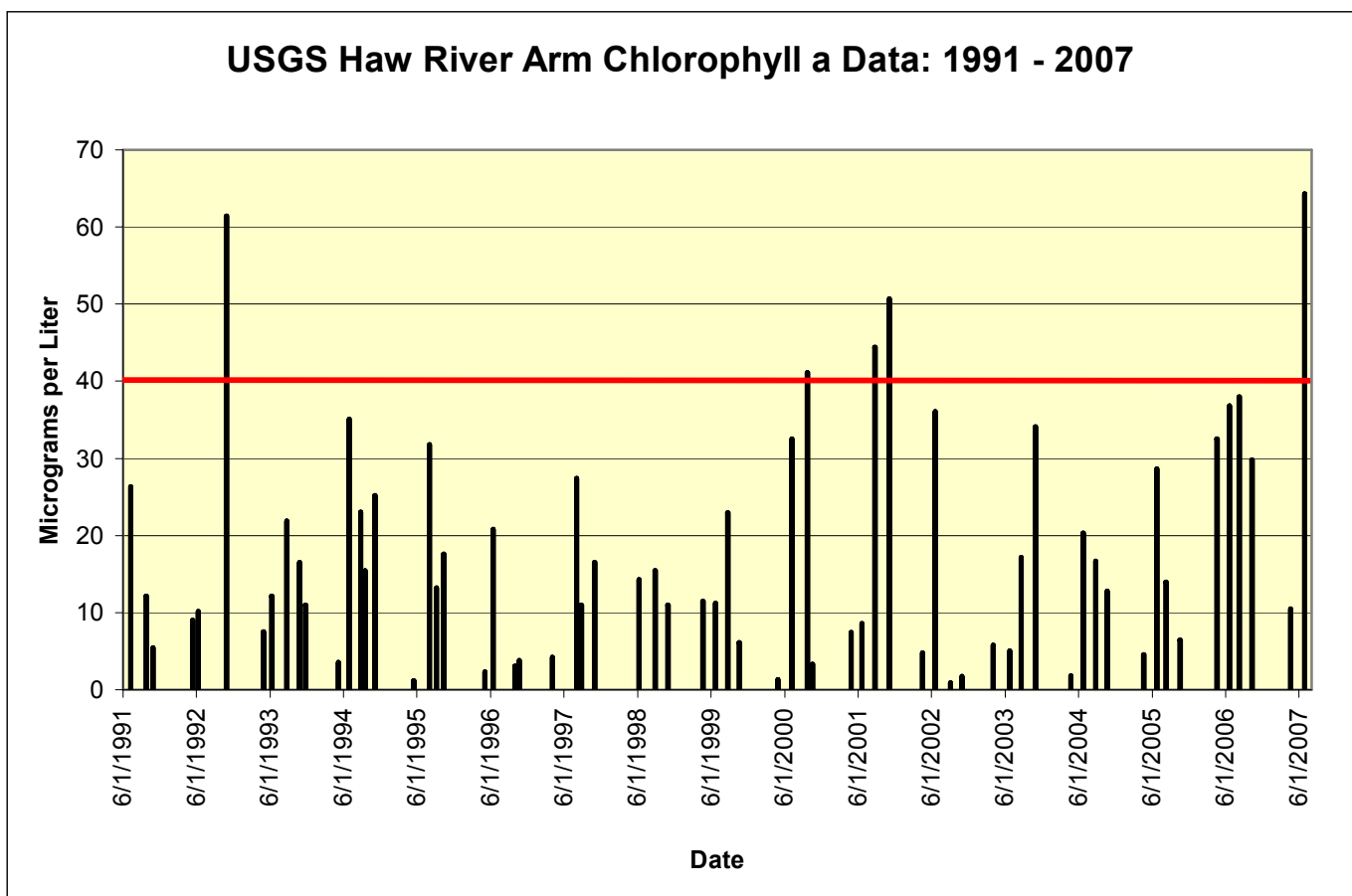
8. The nutrient response model has been calibrated and verified, but according to NCDENR staff (Michelle Woolfolk, Alamance Community College, May 2, 2005) the model never went through the final step of validation because there was not enough data available. This step requires an independent data set that has not been used for the previous development and calibration of the model.

9. In a 2006 USGS report “Suspended Sediment and Nutrients in the Upper Cape Fear River Basin, North Carolina, 2002-04, with an Analysis of Temporal Changes, 1976-2004” authored by Timothy B. Spruill, Phillip S. Jen, and Ryan B. Rasmussen, the authors investigated water quality in the Haw River and Deep River. This report states that the water quality in the Haw River, as it relates to sediment load and nutrient

concentrations, has improved significantly over the period of the investigation. This report was provided to Rich Gannon as a separate mailing for inclusion in the rules record. This trend should be considered in deciding what next steps are appropriate.

10. The water treatment problems experienced in Cary are no more complicated or severe than problems experienced from time to time at other drinking water utilities. Many systems have to treat for taste and odor problems due to algae and other factors. The City of Burlington has experienced taste and odor problems from Lake Mackintosh and adds powdered activated carbon to the treatment process for about 8 months of the year to address these problems.

Figure 1. USGS Chlorophyll a data from near the Jordan Lake Dam showing 5 of 65 samples exceeding the 40 µg/L water quality standard.



**The discussion of the science is not included as an argument to disrupt or block the rules or the process. This questioning of the science is meant to point out that the body of the rules may not be supported by good science. This could be a good reason to use iterative adaptive management in the implementation of the rules. TetraTech supports this view in their memo to DWQ by stating “...The significant uncertainty that is present does provide a compelling rationale for use of adaptive management to achieve goals...”**

## THE PROPOSED RULES

11. In 2002 the point source dischargers in the Haw River watershed reported to the EMC about the steps taken to optimize the treatment plants to reduce the nitrogen and phosphorus loading to the river. Since that time those optimization efforts have continued. In addition, Phase II stormwater programs have been developed for urbanized areas, and there have been efforts to educate the public about the water quality issues in our area. As the Phase II programs are implemented there will be new development density and buffer rules implemented. The local governments in the watershed have been actively pursuing improvements in water quality.

12. Point source dischargers have asked for and have been granted an extension of the compliance date for nitrogen limits until the year 2016. Some people are saying that 2016 is too far away, and the compliance date should be 2011. This reflects their lack of understanding of what it takes to modify or upgrade a large treatment facility. The 2016 timeline is consistent with the timeline provided to agriculture (8 years from the effective date of the rule), and is also consistent with other programs requiring multiple years of planning and program development leading to actual implementation.

13. As proposed, the rules place a significant burden on local governments for program development, implementation, monitoring, record keeping, enforcement, and reporting. Local governments (municipal and county) are required to implement all sections of the proposed rules (with the exception of those affecting State and Federal agencies), and enforce the rules. Administrative, inspection, and legal costs will increase local government costs and therefore the cost to citizens. This is not the way the Neuse rules were structured, but NCDENR staff commented that the State does not have the resources to administer even a portion of the proposed Jordan Lake rules. NCDENR does not show additional staff in the fiscal analysis, which is not realistic. The number of new programs and reporting requirements dictates that NCDENR will need additional staff to handle the increased workload.

**Do not require annual reports for the individual components of the proposed rules. Much of the information will be included in other documentation (monthly wastewater discharge reports, Phase II annual reports). The generation of multiple annual reports will be a burden to local government staff as well as State staff. These reports will probably not be read or used by NCDENR staff unless additional people are hired. We propose that information and documentation be retained on site and be available for inspection.**

14. During the stakeholder process there was much discussion of the use of chlorophyll *a* as the water quality standard for determining the status of water quality in Jordan Lake. Part of the discussion centered on the interpretation of the standard, regardless of the actual numerical “limit”. According to Bill Kreutzberger, CDM, who worked for NCDENR at the time the chlorophyll *a* standard was re-written and was involved in that process, the standard was intended to be interpreted as an annual

standard. DWQ staff contacted USEPA about the question of how to interpret the standard. The response was that USEPA allows a seasonal interpretation of the chlorophyll *a* standard but points out that an annual interpretation has been used previously in NC and approved by EPA. The letter from USEPA states "...EPA notes that this approach...is somewhat different than previous implementation of this criterion by the State ...for other water bodies in North Carolina. ...the State applied this criterion as an annual maximum value with an allowable frequency of exceedance of 10%."

**Use an annual interpretation of the chlorophyll *a* standard. The annual interpretation has been used in other basins with other management plans. The letter from USEPA allows, but does not require the use of a seasonal interpretation of the chlorophyll *a* standard.**

15. The basin-wide critical water-supply watershed declaration (15A NCAC 02B.0262) is not consistent with the definitions and regulations of the NCDENR/DEH/PWSS. In general terms such a declaration will have impacts on development, but the specific secondary and cumulative impacts (positive and negative) cannot be assessed at this time. This designation could promote less efficient use of developable land and encourage urbanized sprawl. The critical water-supply watershed designation was explained as a means to bring the entire Jordan Lake watershed under the Phase II stormwater rules. There are provisions in the Phase II rules to bring unaffected areas under these rules as the need is identified. **Remove the language declaring the entire Jordan Lake watershed as a critical water-supply watershed area from the proposed rules.**

16. Apparently, adaptive management (15A NCAC 02B.0262 (7)) can have multiple meanings. Under the NCDENR concept, all proposed measures would be implemented simultaneously with full requirements. After a five+-year period the water quality status would be reviewed and compared to the strategy and the rules. If the water quality improves, NCDENR staff proposes to reduce or remove some of the restrictions. This is a regressive form of adaptive management, in that the money has been spent and the programs have been developed.

A more progressive form of adaptive management would include the incremental addition of programs and restrictions if experience determines that the measures in place are insufficient and water quality is not being protected. This approach would identify those measures that would give the greatest result for the money expended. Streamwalks to identify problem areas for targeted response is an example of alternative approaches. Also, collaboration between diverse groups (local governments and agriculture) may hold promise for more effective efforts. Allowing time for Phase II stormwater regulations to impact water quality before adding more rules is also an example.

17. The proposed nutrient management rule (15A NCAC 02B.0263) includes both biosolids and compost applications as regulated under this rule. These activities are already permitted under the rules for non-discharge systems known as the "2T" rules. It

is important to make sure that beneficial reuse of wastewater residuals is not negatively impacted beyond the existing requirements.

There is a huge loophole in the nutrient management rule. In rule 15A NCAC 02B.0263 (3) (d) there is a statement that could allow for mismanagement of nutrient applications. The rule as proposed states "...This rule shall not apply to residential, commercial, or industrial landowners who apply nutrients to their own property." This negates much of the intent of nutrient management requirements, training, certification, and management plans. Also, the fact that the certification process is only required as a once in a lifetime training without any continuing education reduces the potential effectiveness of the proposed rules. NCDENR staff explained that they did not have the resources to implement a full training and certification program.

**Do not exempt property owners from the requirements if they are applying to their own land, especially if they exceed 10 acres of application area. Also put some teeth in the training and certification requirements to make this an effective, continuing education program.**

18. Data developed by NCDENR staff points out that the nutrient loading from wastewater dischargers is less than half of the overall nutrient loading to the lake. The largest source of nutrient loading is non-point runoff. Specifically, agriculture was determined by DWQ to be the largest single contributor of nutrients (nitrogen and phosphorus). The proposed rules (**15A NCAC 02B.0264**) do not require load reductions from the agricultural operations in the basin, and do not reference nutrient reduction requirements back to the 1996-2000 baseline period. They are required to implement standard BMPs and if they do so they are deemed compliant (15A NCAC 02B.0264 (6)). Agricultural operations cannot be revisited under these rules if water quality does not improve.

**This is obviously not a fair and equitable distribution of the responsibility and/or cost for nutrient reduction in the streams or the lake. Put teeth into the proposed rules for agriculture. It appears that the agriculture community could delay action for 8 years without penalty. At the end of the 8 years it is unclear that there would be consequences for non-compliance with the rules. A famous bank robber said that he robbed banks because "That's where the money is." If nutrient loading is coming from agriculture then the rules need to focus on that and require real reductions.**

19. The proposed Jordan Lake rules are intended to be a set of building blocks that add together to make an environmental policy that will control degradation of our water resources. These rules go beyond the rules found in any other river basin management plan. The most objectionable piece of the nutrient management strategy is the rule concerning existing development which requires nutrient reductions from all previously developed areas by use of structural and or nonstructural BMPs or other load-reducing management measures (**15A NCAC 02B.0266**). This is probably the most expensive rule with the least assurance of any tangible results. The effectiveness of these management

measures is unproven, and DWQ has not devised a method of accounting to track reductions and compliance. Phase II stormwater rules already encompass some components of the existing development rule. The current data does not support the Existing Development Rule as a necessary measure in the Haw River watershed and the improvements to water quality are speculative.

**Remove the language in the proposed rules requiring local governments to assess and implement stormwater control retrofits for existing developed areas. Some of that activity will occur as collateral improvements concurrent with re-development and implementation of Phase II stormwater programs.**

20. The two sections of the proposed rules covering riparian buffers (15A NCAC 02B.0267 and .0268) include too many exceptions and exemptions to make the protection of buffers effective. In many areas that serve as water supply watersheds a requirement for a 100 foot buffer already exists, yet the proposed rules allow a reduction of that buffer to 50 feet. In particular the rules governing forestry are lenient and allow harvesting of trees within 10 feet of the stream bank. The rule states that existing forestry rules must be followed, but those rule appeal to common sense and subjective interpretation, and don't really restrict activity.

21. The Phase II stormwater rules are now in place. After July 1, 2007 all new projects in Burlington must conform to the Phase II ordinance adopted by the City Council. These rules address many of the water quality concerns related to new development (**15A NCAC 02B.0265**). Compliance with the proposed new development rules may not be achievable as they are currently written. The Phase II rules also contain provisions that will apply to existing development (**15A NCAC 02B.0266**), and address some of the proposed Jordan Lake Nutrient Management Strategy measures. Specifically these rules establish the allowed density of development, the requirement of engineered stormwater controls (Best Management Practices – BMPs), stream buffers, fertilizer (nutrient) management, public awareness and education, stormwater system mapping, and the identification and elimination of illicit discharges. These measures should go a long way to addressing the non-point source contributions of nutrients from stormwater runoff for both new and existing development.

The impact to developers will arise from requirements to meet development density restrictions, to install engineered stormwater control measures, to maintain those control features in perpetuity (post development), and to observe additional setbacks from streams and other water bodies. **It is reasonable to allow local governments to implement their Phase II stormwater programs as a first step to addressing water quality concerns. The Phase II stormwater runoff control measures will have significant costs, and should result in improved water quality.**

22. Changes to the point source discharge nutrient allocations can occur as presented in 15A NCAC 02B.0270(4)(a)(i). The rule states the allocations are subject to change “Whenever, as provided in 02B.0262, the Commission revises the wasteload allocations in order to ensure that water quality in the reservoir and its tributaries meets all standards



in 15A NCAC 02B.0200 or to conform with applicable state or federal requirements...” Major changes in the allocation and enforcement of point source nutrient allocations should occur within the rule-making framework.

There is a recurring statement in the section of the rules devoted to point source dischargers (15A NCAC 02B.0270) that should be removed as unnecessary. The rule states in multiple places “The Director shall establish more stringent limits for nitrogen and phosphorus upon finding that such limits are necessary to protect water quality standards in localized areas.” Given the small role that wastewater dischargers play in the overall nutrient loading to the lake, there is no advantage to seeking additional removal of nutrients from the point sources below what is now proposed until all options have been explored. **The provision to revisit the NPDES permit conditions is already included in the permits that have been issued. Other rule-making decisions should go through the rule-making process.**

**23. There is not a clear compliance strategy in the proposed rules. The point source discharge section of the rules addresses NPDES permit compliance but nowhere in the rules does it spell out how, when, or where compliance with the overall Jordan Lake nutrient management strategy will be measured. If all of the items in the rules are implemented will local governments be in compliance? An improvement in water quality is the target, but will it be measured at the last point in the river as it flows into the lake (loading), or will water quality in the lake be used to determine compliance? NCDENR has not devised an accounting methodology to track nutrient reductions and credits for non-point activities. There is still debate about how to establish the baseline loadings in specific jurisdictions. Municipalities can’t agree to an open-ended set of rules.**

#### COSTS AND OTHER CONCERNS

**24. Our main concern is that no one has been able to state with confidence that water quality in the watershed and in Jordan Lake will improve, even if all of the proposed rules are followed. In an article appearing in the Times News, Michelle Woolfolk, then an environmental supervisor at the Division of Water Quality said *"Based on all the analysis that we've done, it should make the water cleaner. If you're looking for me to give you a 100 percent positive answer, I can't do that."* A \$300 television comes with a guarantee. The Division of Water Quality wants citizens in the Jordan Lake watershed to spend approximately \$1 billion without being able to state that water quality will definitely improve. This is not a reassuring thought. With limited funds available we must be good stewards with our resources.**

**25. The Jordan Lake rules carry a tremendous weight and are important both within and outside of the watershed boundaries. If this set of measures is so important to protect water quality in North Carolina, why is there no funding or resources available from the State government? During discussions with NCDENR about joint ventures, NCDENR**

staff has repeatedly said that they have no resources and no money appropriated for Jordan Lake implementation.

**In the proposed rules, 15A NCAC 02B.0266 Stormwater Management for Existing Development, paragraph 3(a)(i) states that “...a local government may seek supplemental funding for implementation of load-reducing activities through grant sources such as the North Carolina Clean Water Management Trust Fund...” This is not true, and should be removed from the rules. Meetings with the Clean Water Management Trust Fund established that no funds are available for implementation of the proposed Jordan Lake rules. Typically grant money is not available for compliance activities required by regulation. If the rules are less specific there may be more opportunities for funding by outside sources.**

26. One of the critical aspects contributing to the success or failure of the Jordan Lake nutrient management strategy is the effectiveness of the public education effort. This has to be more than a patchwork of initiatives by local government agencies. The problem of educating the public to alter behavior to protect water quality is not regional, but needs to be addressed statewide with State government’s participation. The agencies present during our discussions recognize that the State needs to allocate funding and resources in a statewide campaign to educate citizens about the importance of water quality and the measures that can be taken to make a difference.

27. Special interest groups cast themselves as proponents of clean water, wildlife, and the environment while trying to polarize others as being against those things. It’s not that simple. We are all in favor of clean, safe water. Local governments hire staff whose careers are dedicated to protecting the environment. The budgets of these local governments reflect the importance of environmental issues in the millions of dollars spent annually on wastewater collection and treatment and stormwater issues. The issues in our region involve jobs, market competitiveness, the condition of infrastructure, the cost of services, and the ability to develop and grow in the future. There are competing needs for limited resources. We face staggering costs for maintenance of water and sewer infrastructure and the delivery of services to our citizens. Regulatory mandates without funding have become a way of life. Because there are limited dollars to spend, we must act responsibly and spend wisely.

**There has not been a use attainment or use support study of Jordan Lake, or if there has been one it has not been advertised to the public. It is not clear that the lake is not meeting its intended uses. The lake is used heavily for recreation including full-body contact, boating, and fishing. During weekends and holidays people are turned away from the public access points because the crowds are too large. It serves as a regional water supply. It provides flood control and flow augmentation for downstream communities. The lake supports propagation of wildlife as an excellent fishing location and waterfowl nesting area.**

28. There are viable alternatives to the rules as they are proposed. These rules are not the only approach. During the development of the proposed rules many alternatives were

discussed. Cooperative relationships between municipalities, counties, agriculture, special interest groups, and others can consolidate resources into action and make a difference. Identification of where changes need to occur, and plans to make it happen will have more impact than a list of rules. There needs to be further dialog about what the alternatives are. That is not to say that there will be no action. Phase II stormwater rules, treatment plant improvements, and public education will all move forward even as effective measures are discussed.

29. SUMMARY Through sampling, computer modeling, and a stakeholder process the NC Department of Environment and Natural Resources / Division of Water Quality (NCDENR/DWQ) has developed a management strategy for Jordan Lake and the watersheds draining into the lake. We do have concerns about the process that brought us to this point. The quantity and quality of the data, the ability of the computer model as a predictive tool, and the assumptions about uses and impacts are subject to interpretation by all stakeholders. **Our main concern is that no one can state with confidence that water quality in the watershed and in Jordan Lake will improve, even if all of the proposed rules are followed. While moving forward in some areas, the City of Burlington is suggesting steps to improve the decision process while there is time. We are proposing that as stewards of the environment and public funds, we should examine the issues and come up with the best possible approach.**